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ORIGINAL ARTICLES.

MONOCULAR DIPLOPIA.—ITS RELATION TO HYSTERIA.

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From the time when Prévost, in the *Annales de Chimie et de Phÿsique,* t. 57, first observed monocular diplopia upon himself and reported another case from an American practitioner, until the more recent work of Parinaud in the Norris and Oliver Handbook and the excellent "Eye and Nervous System" of Posey and Spiller, observers have been almost unanimous in the opinion that hysterical unilateral diplopia, polyopia, micropsia and macropsia (the "megalo-micropsia" of Parinaud) are due to a peculiar kind of spasm of accommodation whereby the lens is fixed in its curvature, focusing at only one distance and thereby destroying the amplitude of accommodation, which is left intact in the ordinary spasms of accommodation seen in otherwise normal individuals.

From the following tests, Parinaud states this theory quite explicitly: A match moved backward and forward from the point where it is seen singly and distinctly is first seen indistinctly ("confusion-circles" on the retina) then double, the second image usually separating on the temporal side, with an occasional third, and fainter, image on the nasal side. "When the diplopia appears beyond the point of single and distinct vision, it disappears with the use of appropriate concave glasses;

if on the proximal side, with convex glasses. Careful interposition of a screen in front of the pupil causes the images to disappear one by one."

Parinaud therefore maintained that these symptoms in hysteria are due to an error of refraction, and result from physical causes. "Multiple images of an object are actually projected upon the retina and are perceived as such." * * * * "The amplitude of accommodation is practically nil, and the eye is adapted for distinct and single vision at a fixed point." * * * * "Polyopia also accompanies paralysis of the ciliary muscle, and it can be demonstrated in normal subjects whose eyes are under the influence of atropine."

"The disposition of the anterior portion of the lens in three segments favors its changes in curvature, but at the same time, owing to their separation from one another by layers of amorphous material, each section possesses a focal point of its own, capable of producing images distinct from that yielded by the lens as a whole. This production of polyopia may be compared with the classic experiment of Schreiner, and in fact, is explained in the same way. Monocular diplopia due to accommodative spasm may be produced in persons having a sufficient amplitude of accommodation.*

"In the same way, even when one eye is closed, there will be double images on account of insufficient accommodation." * * * * "A condition of spasm is more favorable to the production of these phenomena than is paralysis, inasmuch as the former, by increasing the convexity of the anterior surface of the lens, serves to emphasize the diplopia arising from structural defects in the crystaline lens."

Further: In accommodative spasm, the object grows smaller with the increase of the distance from the eye. "In other words, the appearance of the object corresponds exactly to the size of the retinal image." He then weakens his theory by inventing another hypothesis for the reverse of the above phenomenon, viz., "It sometimes happens that patients see objects increase in size as they are withdrawn from the eye, although the retinal image necessarily grows smaller. The apparent enlargement,

*NOTE.—This theory of Parinaud has been supported by many able investigators, among them C. J. Bull, of Paris, who sawed a lens into three sectors and joined them together again. He succeeded in obtaining polyopia, but Verhoeff (Archives of Ophthalmology, Vol. XXIX., No. 6, 1900) showed that the polyopia is due to spherical aberration and maintained that, if the sectors of the lens of Bull could be reassembled perfectly, there could be no separation of images by the lines of joining.

in these cases, seems to be due to the formation of diffusion-circles on the retina. Indeed, in monocular diplopia, the single image of an object appears large owing to the juxtaposition of the two imperfect images just before they are seen to be distinctly separate."

In his report of a case of monocular diplopia from Mendel's clinic in 1893, Karl Lissauer published a brief history of the investigation of the subject which is interesting from the viewpoint of optics, but does not seem to bring us nearer to the solution of the problem neurologically: Wallaston believed that the diplopia was due to a breaking up of the lens. Prévost ascribed his two cases to senile changes.

"In 1835, Steifensand assumed that the eye was composed of two lateral halves which had grown together, and that this separation to a certain extent still existed. Rays extending beyond the central focus are divided into two bundles and as a consequence myopes must have double images because of the great distance of the cornea from the central focus. In the normal eye, since the focus falls upon the retina, there will be single vision. Three years later, he advanced the theory that if the axes of the cornea and lens are displaced toward each other, the eye must see double, since the displacement of the lens causes an unequal refraction of the rays falling upon its edge and they are thus broken up into several foci. Assuming this displacement in myopia, he explained the rareness of diplopia compared with the great number of myopes by saying that they learn to correct the defect."

"Decondé, *Annales d'oculistique,* 1843, IX., distinguished as many forms of diplopia as there are parts of the eye which could cause it. He seems to have been the first to concede the possibility of its being due in some instances to 'disturbances in brain-activity,'" and Lissauer admits the possibility in two of three cases reported by Decondé of disturbances of the "perceptionscentrum" whereby it became incapable of correctly interpreting the impressions received by it.

Meyer of Zürich, in *Henle u. Pfeufer's Zeitschrift,* 1846-1847, V., believed that monocular diplopia was purely physical—i. e., rested upon faulty accommodation. "The greatest cause is myopia, and those myopes who pay great attention to their sensations (i. e., hypochondriacs and hysterics) perceive a doubling of objects."

Helmholtz named the ability of the eye to yield several images "Monochromatic aberration," and in 1862 Teulon ex-

pressed the opinion that only the lens plays a role in the Scheiner experiment. "In 1864 Dousmani-experimentales sur la diplopie monoculaire (*Archiv. général. de méd.*) gave all possible means of causing diplopia: ribbon-shaped clouding of the cornea, ulcers which lead to faceting, synechiæ with exudates which leave only portions of the cornea free, myopia, presbyopia and beginning cataract; concluding with cases where without demonstrable changes in the eye, diplopia appeared in hypochondriacs, hysterics and after cranial injuries." He cut away the cornea and iris from the fresh eye of an ox, made a window in the sclera behind and observed through the latter distinct secondary images appear as a result of changes in the lens, and these disappeared with the interposition of a diaphragm. He used atropine in his eye and observed foggy vision, micropsia, diplopia and polyopia, which vanished when a card with a small hole was placed before it.

Donders maintained that it was the exception to find an eye with intact lens in which polyopia monocularis was entirely absent. "On a gray or white ground, one gradually approaches a small black point to the eye, more than the distance of its near-point. Most men will then observe that the spot will be transformed into a circle of gray specks, which, if the point is removed from these, will approach one another and upon reaching the point of distinct vision, will blend into a single black point. It is desirable that the eye remain focused for the distant point in order that the pupil may remain unchanged in diameter. Non-myopic individuals must therefore place before the eye a convex glass of 1/6 to 1/10 in order to be able to bring the black point to this or that side of the point of distant vision while the eye remains relaxed." He attributed the cause to normal irregular astigmatism. He repeated this experiment with a fine white point on a black surface and concludes: "These experiments have demonstrated to us that the polyopia resulting from regarding a small object is the same phenomenon as those rays observed when a luminous star, or a light for which the eye is not accommodated, is seen from a great distance." He then refers to the dividing of the lens into sectors by the lines of the "star-figures" and explains polyopia by the assumption that each sector projects its own image upon the retina. "In the proportion as we accommodate, the numerous images approach each other and blend finally into one." But even by most perfect accommodation, they are not exactly superposed, on account of a regular astigmatism.

From the history of the literature and the fact that the lens can under certain conditions project secondary images upon the retina, investigators reasoned that these were the images of the hysterical eye and that they only became pathological "if they came to the consciousness of the individual as polyopia." Bruecke (Vorlesungen ueber Physiologie) [Ref. Lissauer] held that the chief cause of Helmholtz's monochromatic aberration lay not only in the texture of the lens but also in the shape of its surface. "The lens has a radiating structure and its fibres are arranged around different axis-systems, and the polyopia is attributable to this arrangement." He says that the normal man does not perceive the double images because he accommodates correctly and the images lie so near one another that they partially overlap and we may then "take it for granted that the sensation is so far corrected by the judgment that the double images are simply eliminated." Many observers, with Lissauer, assume that, since hysterics are often hypersensitive, they would more readily perceive the double images than normal individuals.* * * * "Of course I would not exclude the possibility of brain lesions, especially of the visual center, causing disturbances of accommodation. * * * * We would easily come therefrom to the conclusion that if actual lesions of the cerebrum can lead to such diplopia, changes of the finest kind may take place from hysteria which result in diplopia."

There are some cases in the literature, however, which remain unexplained by the accommodation theory and which can only be accounted for by supposing a central disturbance, or cortical dissociation.

Even in 1840, Fallet (Annales d'Oculistique) expressed the opinion that the cause of monocular diplopia was a confusion (Verwirrung) of perception without his neurological confrères coming any nearer to the subject. Niematschek reported a case in 1864, to which Lissauer refers, of a soldier shot in the middle of the forehead, with diplopia from the time of the injury. Lissauer here accepted the probability of a perverse brain-activity as a result of the "commotio cerebri", causing the diplopia. He also referred to a case reported in the Journal des Sciences Médicales by Duret and Dujardin in 1892 of diplopia following cranial injury without demonstrable changes in the eye, without hysterical symptoms or signs of any neurosis. The assumed a commotio cerebri which led to a lesion of the cortical center for sight, causing also amblyopia.

Having reviewed the literature to date, I have become convinced that there is a tendency to dismiss all cases of hysterical monocular diplopia with the explanation that it is accommodative. While it is very true that physical causes—from cornea, iris or lens—are the usual causes, in the light of modern knowledge of hysteria, it is unscientific to denominate these symptoms "hysterical conditions" when they are not directly referable to a cerebral disturbance. If any spasm of accommodation can cause monocular diplopia, why call the latter hysterical whenever it happens to occur in hysteria? There is no doubt that in the diplopia of myopia the double images can be doubled again by interposing a prism so that the edge passes through the center of the pupil, and this is also true in spasm of the ciliary muscle with diplopia; in fact of monocular diplopia in general when purely physical.

There is also no doubt that after strabismus operations, a diplopia may appear in the operated eye, which must be referred for explanation to a pseudo-fovea. Bjelilowsky, Ueber monoculäre Diplopia ohne physicalische Grundlage (Bericht ueber d. 26te Versammlung d. ophth. Gesellsch. Heidelberg S.93, Michel 1897).—In an 18 year old girl, one eye had been removed and the other had formerly been amblyopic and converged. The images were slightly tipped toward each other. "Optically the diplopia could not be explained." Upon looking at a colored object and bringing behind one of the double images a complementary (back) ground, "one could demontrate the emulation of the two fields." This case of Bjelilowsky (elaborated in Archiv. f. Ophth. XLVII. p. 143) and that of Koster (Monoculäre Diplopie nach geheiltem Strabismus digervens ohne physicalische Grundlage (Nederland. Tijdschr. v. Geneesk. I. p. 1437. Ref. Michel) indicate, according to their reporters, the possibility of that portion of the retina which had acted as the center of distinct vision during the strabismus remaining so sensitive afterward that there would be in function actually two foveæ which receive separate impressions of the same object (the image of which will cause two sensations within the space through which the originating strabismus had separated the anatomical, little used, fovea from the physiological, functioning, fovea).

But there are cases without demonstrable eye-lesion or spasm of accommodation which cannot be explained in any other way than by supposing a cerebral disturbance and among these are

the only ones which should receive the name "Hysterical Monocular Diplopia." The case reported by Lissauer is an example. As suggestion-cause, I would mention a binocular diplopia which preceded the monocular and which was attributed to a paresis of the left rectus superior. The central origin of this diplopia seems to me to be proven by the fact that when the left eye was closed, the double images remained, while closure of the right eye caused them to appear to blend. She described them as situated *the one over the other* (instead of the usual manner of separating first toward the temporal side with a possible third image toward the nasal side) and of nearly the same distinctness. "There was no accommodative spasm, the eyes were emmetropic, Vision=6/6. This right-sided diplopia disappeared after a four weeks duration under galvanization of the head, "as suddenly as it had appeared." I do not believe that galvanization of an emmetropic eye without accommodative spasm could have caused the disappearance of the images through any influence on the ciliary muscle or, therefore, curvature of the lens.

In 1876, Henry Lawson, in the *Med. Times and Gazette,* Vol. 53, p. 671, (Ref. Michel) reported two cases in which five minutes after the subcutaneous injection of morphin in the arm, contraction of the pupils and diminution of vision both for near and for distance took place, accompanied by monocular diplopia, which was not corrected by any convex or concave glass. The cases were both unilateral, the one of the right, the other of the left eye. "This effect resulted in an unequal degree every time, although with equal dosage."

In 1881 (*British Med. Journ.,* Oct. 22, p. 667, Ref. Michel's Jahresbericht), Adams described a case of monocular diplopia in a maid who had suffered shortly before from an injury to the cranium. She was young and hysterical. "In the eye there was nothing abnormal." Ord reported a 13 year-old boy who had hemiplegic convulsions followed by strabismus convergens and double optic neuritis. He had binocular diplopia and monocular diplopia (either eye). Post mortem yielded a large old clot in the lateral ventricle, with a disturbance of relation of the basic ganglia. His other case was that of a 28 year old man with epileptic attacks, left hemiplegia and anæsthesia with paresis of both externi. He saw four images with both eyes, two with one; "the left eye gradually became blind while the right became amblyopic under concentric narrowing of the fields." Nothing abnormal in fundi.

Amercrombie had a case of a large abscess of the temporal and occipital lobes in a ten-year-old girl which had caused headache, optic neuritis, abducens paresis and right monocular diplopia. He suggested that the abscess must have greatly "interfered with the functions of the group of fibres which Gratiolet has described as the cerebral expansions of the optic nerves. If, as now believed, each optic nerve is connected with the cortex of both hemispheres, it is conceivable that in such a case as this, the right hemisphere might not act in unison with the left." In the *British Medical Journal* of 1883, Anderson and Gunn gave an account of a 34 year-old painter with paresis of the left externus and the usual homonymous diplopia. When he closed his right eye, he saw double. Both images were distinct, the right quite clear, the left dim, as were the images in the binocular diplopia, but nearer together than these. It was impossible to separate the images by means of a prism so that three images would result. There was no suspicion of malingering, "no interest in deceiving." In addition were atrophy of the left quadriceps cruris, loss of knee reflex on the left side, slight atrophy of the muscles of the right shoulder, marked diminution of sensibility in the region of the left trigeminus and atrophy of the muscles supplied by the third branch of the trigeminus, suspicion of syphilis. Under Kali Iodid. the paresis, binocular and monocular diplopia disappeared.

In the same sitting of the Society, Nettleship laid stress upon the fact that the diplopia in his case was only in the outer periphery of the field "on the side of the paretic muscle." (Suggestion?) ,

Soon afterward, Targett (*British Med. Jour.*, 1883, 1, p. 1151) presented a 56 year old man with right abducens-paresis, dilatation with immobility of the pupil and right monocular diplopia, only in the outer half of the field. Perception of red and green was wanting. The eye became blind from optic atrophy. Knee-reflex right was much weaker than left. Incontinence of urine at night. No sign of ataxia. Syphilis probable.

Naturally one could protest that in some of these cases spasm was not excluded by the reporters, but it would be strange if, after all of the previous reports and discussion of cases caused by "accommodative error," these trained observers had not taken them into consideration and had reported spasm if they had found it.

Brunswig (*Recueil d'Opht.*, p. 468, Ref. Michel, 1889), after

observing a case of alleged monocular diplopia believed that it had to do with suggestion in a hysteric.

Pergens (*Revue generale d'Opht.,* 1898, Nr. 2, Ref. Michel) reported the case of a 37 year old man who had had monocular diplopia for 5 months. Images above one another—the lower the stronger. Glasses and stenopaic aperture had no influence. With two eyes only two images were seen, but with prisms, bases down, four images. After a month, the images separated to twice their former distance from each other. Later the phenomenon disappeared almost entirely. He assumed that the brain centers did not act harmoniously (einheitlich) any longer. The centers for binocular association were not attacked. Lately the invalid had detected formication in the left temporal region. (Ref. Michel.)

In 1902, Zimmermann (*Ophthalmic Record,* p. 374) reported two cases:

A shirt-factory girl, 15 years old, in perfect health, had bitemporal headaches with asthenopia. Under hyocyamia sulphate, the media and fundi were found to be normal and she was given

O.D.+0.75 Sph.
O.S.+0.05 Sph.+0.25 ax. 90.

She casually remarked that she had had diplopia in the left eye four years, giving three images with the two eyes. At 20 feet, the images were 3″ or 4″ apart. Three images remained visible up to her reading point. The patient usually ignored the images. There was marked partial reversal of fields in the left (affected) eye. Some months afterward, patient reported the images still present.

His second case suffered with diplopia every one or two weeks for three years which always occurred in distant vision. For a time glasses had given relief. Under atropia she was given +1.5 Sph. +0.5 Cyl. ax. 90°, which completely relieved her headache and asthenopia but had absolutely no effect upon the diplopia.

Cases such as the above selected form the class of cases which in my opinion should be listed as cerebral; and only those cases of monocular diplopia which cannot be explained by any other hypothesis (based on physical, retinal or organic abnormalities), *and associated with sufficient stigmata of hysteria,* should be classified as hysteric.

When one considers how often we meet with spasm of accommodation in normal patients, without any mention on their part of these symptoms of "accommodative error" and that spasm

of accommodation is very common in hysteria while these symptoms are comparatively rare, it seems to me that it is going too far to say that, because these symptoms are produced by errors of accommodation in some instances, they are in all cases caused by them. It is much more reasonable to explain them by a cerebral dissociation whereby the judgment (*e. g.* size, etc.) is dethroned. Certainly it is hardly fair to name them hysterical if they are all explainable entirely by accommodative spasm. They should then be called simply "symptoms of accommodative spasm" whether the latter is caused by hysteria or some other condition.

When symptoms cannot be ascribed to "dissociation of consciousness" and are not amenable therapeutically to suggestion, I do not believe that we are justified in classifying them as "hysteric." When Parinaud maintains that spasm of accommodation accounts for all of these symptoms, he evidently assumed a dilated pupil, because he says that the interposition of a screen shuts off the images "one by one." As a matter of fact, the pupil in spasm is usually contracted, and therefore it should exclude the secondary images in the hysterical as well as in the normal-minded patient, if they are constantly present as the refraction-phenomena of an unequally refracting lens.

If hysteria has been correctly defined as "Self-suggestion", "Auto-hypnotism" or in the light of the modern, and I believe more accurate conception, "Dissociation of Cerebral Centers", whereby impulses or impressions are not interpreted or are incorrectly interpreted or are transferred to another tract, motor or sensory, by confused judgment (resulting in, *e. g.*, the effect of crossed electric wires), one cannot then indicate as a symptom of hysteria that which is present in all eyes under given conditions of accommodation (diplopia, polyopia, megalo-micropsia) simply because it is being interpreted correctly. According to that explanation, the "correct interpretation" of the visual impression is hysterical.

There is then no doubt that there are secondary images thrown upon the retina of all eyes, which the normal individual does not see and which the *hypersensitive patient* sometimes sees. But hypersensitiveness must not be confused with hysteria, and the question still remains whether these images projected by the lens upon the retina are really the ones which the abnormal individual sees in every case: or whether, in many of these cases, it is not impossible to multiply the images by means of a double prism,

and whether they are not the result of some perverted sensory impression so often seen in hysterical patients and not yet explained in other fields of observation than the eye. It seems to me quite possible that the interposition of a screen or of indifferent glasses or of "appropriate convex or concave" glasses may, *in the hysteric individual,* render the image single by suggestion, and that it is the duty of the ophthalmologist to differentiate such cases from those truly accommodative. As far as micro-megalopsia is concerned, one must remember that, *in the hysteric,* the stimulation of 1,000 cones by the image may cause the impression on the brain of a stimulation of 5,000 and vice versa. All things are possible to the hysterical cortex.

In conclusion, monocular diplopia may be divided into four varieties:

First, that form which proceeds from physical causes;

Second, that resulting from the activity of a pseudo-fovea simultaneous with that of the anatomical fovea;

Third, a form associated with cerebral lesion;

Fourth, a form not accounted for by any other hypothesis than that there is a cortical dissociation, which is the basis upon which hysteria is explained by the majority of modern neurologists.

MEASUREMENT OF THE DEGREE OF HETEROTROPIA.

By Lucien Howe, M.D.

BUFFALO.

[From advance sheets of the second volume on the Muscles of Eye by G. P. Putnam's Sons, New York.]

§ 4. *Which Method is Best?*—In general some one of the objective variety, as with all of these we eliminate the personal equation of the patient. For children and ignorant patients the strabometer with the arc, which has been described, is perhaps the most convenient, as no special position of the patient is demanded. For more intelligent patients, the objective measurement with the flattened perimeter is preferable. Where special accuracy is required, especially with high degrees of esotropia where the corneal reflexes cannot be seen because of the pro-

jection of the nose, a tropometer of some form is not only a convenience but a necessity.

When operation is contemplated, reliance should not be placed on any one method, but the findings with one should be checked off by those of another. Careful measurements also should be made not only with the accommodation at rest, but with that function in different degrees of activity.

§ 5. *Photographs* of cases of heterotropia. These are often seen in chapters on this subject and in popular articles. But it should be remembered that they are not always reliable, as much depends upon the position of the patient and on the condition of the accommodation at the moment when the photograph is taken. Sometimes an esotropia may be of a high degree, but decreases gradually or entirely disappears if a full dose of a cycloplegic is applied to each eye.

In spite of these disadvantages, if photographs are conscientiously made, they give a very fair idea of the condition and are particularly useful for comparison before and after treatment. Probably the best way of making them is to focus particularly the corneal reflection. This method has been elaborated with considerable care by Maddox, and he figures a camera adapted especially for this purpose (B 263 p. 333). I have found, however, that these corneal reflexes can be brought out very satisfactorily simply by placing in front of the ordinary camera, a mirror with a hole in its center. It is not even necessary to have a hole in the glass itself, but it suffices to scrape off the quicksilver from the back of the mirror over a space less than the size of the front lens of the camera. The mirror can be held in place with the clamp of a retort stand or in any similar simple manner.

III. Measurements of the position and character of the arc of rotation. The measurements thus far described relate to the *amount* which one eye deviates from the position which it should occupy—that is, the static condition. But for certain purposes it is desirable to measure the position and the character of the arc of rotation and also the lifting power of the adductors—that is, the dynamic condition.

(*A*) Position of the arc of rotation. We have already considered various methods of measuring the field of fixation (Vol. I, p. 189), and as a normal eye sees every object toward which the visual axis is directed, therefore under such condition the field of fixation corresponds to the arc of rotation. But when

an amblyopia exists, as is frequently the case with heterotropia, then the field of fixation is often much less than the arc of rotation. Therefore for these abnormal movements it is more definite to speak of the "arc of rotation."

In regard to these apparently we should distinguish the normal, the relatively normal, and the abnormal arcs of rotation.

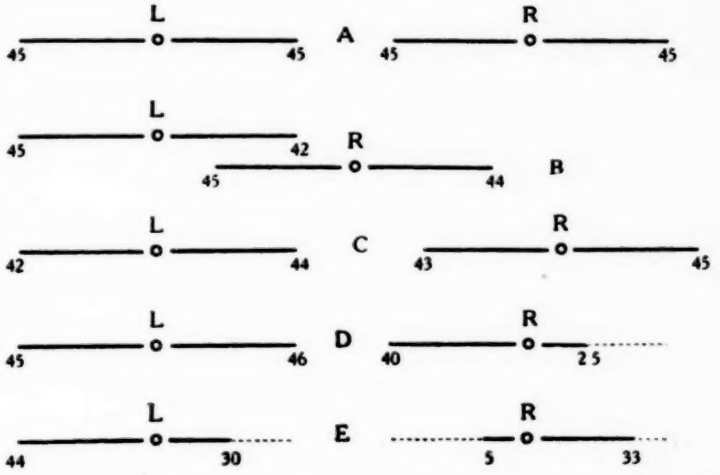

Fig. 52.—Diagrammatic representation of arcs of rotation.

(A) Normal.
(B) Esotropia of right, arcs of normal length but abnormal position.
(C) Exotropia of right, arcs of normal length but abnormal position.
(D) and (E) Arcs of rotation of right, abnormally short as in paresis.

(*a*) A normal arc is one of normal length measured from the primary position of the visual axes. It will be remembered (Vol. I, p. 196) that the eye can usually rotate laterally through an entire arc of at least 85 or 90 degrees and vertically through an arc of at least 80 or 85 degrees. It is true that different students of the subject have obtained slightly different figures as the limits of the field of fixation, but these diferences are rather of academic interest. For our present purpose, it is sufficient to suppose that an eye can normally rotate from the primary position in and out about 45 degrees. As the motion in the horizontal plane is the one with which we have to do most frequently, we can represent that by diagram as in Fig. 52-A. In reality these two fields of fixation overlap each other, but it is most convenient to represent them in this way.

(*b*) A relatively normal arc is one of normal length, as measured from the position which the axis of the deviating eye occupies when the axis of the fellow eye is in the primary position. In measuring this, the position of habitual deviation should be counted as the zero point. Thus, suppose we have a case of esotropia of the left eye which measures ten degrees when the fixing eye is in the primary position. If we wish to measure the relative arc of rotation of the left eye, the head should be turned a corresponding number of degrees to the left. In order to do this, I have had the iron stirrup which holds the wooden bit of my perimeter adjusted on a vertical pivot, and an index passing over a horizontal arc shows how many degrees the face is turned to the right or left. If the eye can rotate *from that point* inward, and also outward 45 degrees, the length of the arc of rotation is normal, *in relation to* the position occupied by the visual axis when deviated in.

Although the arcs of rotation in normal eyes really overlap internally, we represent them most conveniently as in A. But in esotropia if the arc internally is normal, it must overlap the one for the other eye to an abnormal degree, and it is easiest to represent this as in Fig. 52-B. Strictly speaking, the adjacent portions of these two horizontal lines L and R should be superimposed, but, unless we use inks of different colors, this gives rise to confusion in our case records, or in printing, so that for practical purposes the arrangement here given proves the best.

Again, we can represent an exotropia with a relatively normal arc of rotation, just as we do the normal condition, only with a considerable space between the arcs. Fig. 52-C.

(*c*) Abnormal arcs of rotation may be contracted in one eye in one direction or in all directions, or such limitations may exist in both eyes. Or the arc of rotation may be enlarged in one eye in one direction or in the corresponding direction in both eyes. Fig. 52-D and E.

(B) Character of the arc of rotation. If a person with normal eyes tries to look rapidly to the extreme right and left, as the globe swings from the limit of fixation on one side to the limit on the other, it does so in one steady, uninterrupted sweep which is quite characteristic. There it halts, then it swings back in the same way, and halts practically the same length of time before starting again.

These movements of the globe have been photographed not only when the eyes are normal, (Vol. I, p. 202) but when one of

them deviates from the position which it should occupy. The number of the latter thus far made is comparatively small, but nevertheless sufficient from which to draw one or two conclusions. These are:

(*a*) In certain cases of deviation inward, the *character* of the swing of the globe from side to side is normal, or nearly normal. A photogram of the swing from side to side of a normal eye has been already given (Vol. I, p. 206). Very similar to this are the photograms which have been made of the deviating eye of a few children with esotropia—especially those in whom there were practically no symptoms of a paresis. But it should be understood that the photograms of cases of esotropia and exotropia are not always like those for the normal eye. Not infrequently there are considerable irregularities in the motions of the globe, as shown by the tracing on the photographic film even when they cannot be recognized otherwise.

The important point is that in the cases of esotropia in young persons in which a photograph has been attempted, the results are sometimes quite like those obtained from normal eyes, except, as will be mentioned under (*b*), that the period of rest at the outer limit seems to be abnormally short as compared with the period of rest at the inner portion of the arc of rotation. Later we shall find that when a paralytic condition of any muscle is present, the swing in one direction or the other, or in both directions, is much more irregular.

(*b*) When an eye which habitually deviates moves rapidly from side to side, the *time* of the halt in the direction of the deviation is often greater than the halt in the opposite direction. Even when a normal globe moves in that way, and the fellow eye is closed the halt inward, is for some persons longer than the halt outward. Consequently it cannot be asserted positively that any peculiarity in this respect is characteristic of a non-paralytic deviation.

IV. Measurement of the lifting power. The method of doing this for normal eyes has been already described (Vol. I, p. 200). It has been observed that the lifting power of the adductors varies even under normal conditions, or at least such seems to be the case with the appliances thus far at our command. It would therefore be unwise to draw very positive conclusions as to measurements of the lifting power of deviating eyes. Moreover, it should be repeated that the lifting power

is not to be measured only by the number of grams lifted, but also by the behavior of the eye while making the effort. Therefore in deciding what is normal and abnormal both of these elements should be taken into account. From the data, such as they are, it would seem that cases of esotropia can be divided into three classes, in regard to the relation of the lifting power of the adductors to the arc of rotation outward. These are:

(*a*) When the lifting power is practically normal, but the arc of rotation is also apparently normal. The apparent contradiction in the findings should, however, be frankly stated.

(*b*) When the lifting power of the adductors is distinctly greater than normal, but the arc of rotation outward not only relatively but actually normal. Such cases are evidently even more difficult to explain than those just referred to. They are, however, rare exceptions.

(*c*) In most cases of esotropia in which the lifting power was measured, it was found to be distinctly greater than normal, and the arc of rotation outward less than normal. This is what we would expect. It indicates an excessive action of the adductors with imperfect action of the abductors, and as a natural result the eye turns inward.

In regard to these measurements of the lifting power of the adductors, and also the character of the motion in and out as shown by photography, it should be repeated that the data thus far obtained are not sufficient on which to base positive conclusions. Moreover, as such measurements are inconvenient for the patient, and require no small amount of time and care on the part of the surgeon or his assistant, they are out of the question practically for most cases.

When, however, it is impossible to determine from other data whether a given deviation depends upon an excessive contraction of one group of muscles or a relaxation of the opposing group, and when this question ought to be decided before we decide in that case whether to make a tenotomy or the more difficult and tedious advancement, then for purposes of exactness it is eminently desirable to obtain if possible the additional information which the lifting power and the photographic measurements do afford.

MEDICAL SOCIETIES.

OPHTHALMIC SECTION
OF THE
ST. LOUIS MEDICAL SOCIETY.

Meeting of November 13, 1907.

The Vice-Chairman, DR. BALL, in the Chair.

Congenital Defect of Abduction with Retraction of the Globe in Adduction (Patient).—Dr. John Green, Jr.

This case is a typical example of that peculiar congenital anomaly of the ocular muscles in which the globe is retracted into the orbit in adduction and comes forward and is restricted in abduction. It is the second case I have encountered of this rare condition of which there are only about sixty cases in the literature.

DISCUSSION.

Dr. Alt stated that recently he had had occasion to see a case which probably had the same congenital cause. This patient could not raise either eye above the horizontal line; attempts to raise the eye provoked a nystagmus.

A New Attachment for the Skiascope (Demonstration).—Dr. E. H. Higbee.

In nearly all instruments for measuring the refraction of the eye, a chin rest is provided for the purpose of keeping the patient's eyes in one position. This is a mistake which I have endeavored to obviate by constructing an eye-piece, much the shape of an eye-cup; when you place the patient's eye inside the cup he will keep it permanently in the one position. This attachment I have made for the skiascope. The cup is attached to one end of a flat spring, the other end having a lug which drops into small holes on the skiascope disc. The holes are placed in such a position that the lug on the spring drops into them as you turn it. The eye-cup, being on the other end of the

spring, comes exactly opposite the lens each time. In the instrument that I have made the lenses are much smaller (⅝ inch in diameter) than those in the ordinary skiascope, but by having the eye permanently fixed I find that my results are just as good as with the larger lens and the work can be done with just as much facility. Another advantage of the eye-cup is that the fact that it excludes all rays of light except those which come from the skiascope mirror.

This is an inexpensive attachment which can be made for any skiascope in which the lenses are inserted around the margin of a circular disc. The middle of the spring is bored out in such a manner that it can be attached to the axis upon which the disc turns.

DISCUSSION.

Dr. J. Ellis Jennings stated that he thought Dr. Higbee's model a very convenient arrangement; its distinct advantage consisting in the fact that the eye shield excluded all light except that coming through the pupil.

Congenital Aniridia with Cataract (Patient).—Dr. John Green, Jr.

E. J., 26 years old, male, native of Missouri. Family history absolutely negative with reference to any ocular defect. "Something queer" was noted about the patient's eyes at birth. Vision had never been good, but up to the age of fifteen the patient could see sufficiently well to distinguish the larger letters of the schoolbook by holding it very close to the face. The left eye has always been the better one. About three years ago vision began to fail in the right eye and within the past year in the left also. There has never been any definite ocular pain but at times a vague aching in the temples. Examination shows a clinically complete absence of both irides. Both anterior chambers are shallow; in the right the lens comes forward almost to Descemet's membrane. Both lenses are cataractous, the right more opaque than the left, and tremulous. There is horizontal nystagmus. Both corneæ measure 10 mm. in diameter and present a delicate peripheral infiltration in the deeper layers; there are also a few pin-head spots of infiltration nearer the center. The eyes are kept half closed. After eserin both chambers become deeper and one can see the circumlental space and fibers of the zonule of Zinn. The left lens is densely opaque centrally and presents capsular opacities as well as changes in the lens substance in the

periphery. R. V. perception of light, L. V. fingers (uncertainly) at one foot. On needling the right lens there was a gush of soft lens substance that sank to the bottom of the anterior chamber. After operation tension was somewhat raised but lowered under eserin salicylate and dionin. Tension is now equal on the two sides, but slightly plus. R. V. with plus 13, sph. 16/120.

DISCUSSION.

Dr. Saxl stated that he had seen two cases of aniridia. One was a man with aniridia and cataract who was operated upon by needling. The second case was a boy who had complete bilateral aniridia. His vision was better than one would expect.

Dr. Green asked for opinions of members as to the future treatment of the operated eye. Tension in the operated eye was now about equal to that in the unoperated eye. These cases bear operation badly. Iridocyclitis and glaucoma are the complications most to be feared.

A Case of Homonymous Quadrant Anopsia (Patient and Abstract).—Dr. Llewellyn Williamson.

This paper was printed in full in the December, 1907, number of this journal.

DISCUSSION.

Dr. John Green, Jr., stated that in this connection the history and ocular findings of a patient with an old head injury, seen recently in consultation, might be of interest. This was not a case of quadrant anopsia, but of symmetrical homonymous defects in the fields.

P. S., age 24, male, single. Ocular examination Nov. 11 and 13, 1907, in consultation with Dr. W. W. Graves.

Ocular History.—Has always been near-sighted; left eye has diverged all his life. States that vision in left eye is much worse than in right and has always been so.

Examination.—Patient fixes with right eye and has a decided tendency to hold head with chin down and to left. O. S. diverges 15 degrees and turns down a little. Left upper lid droops slightly. In primary position there is constant rotary nystagmus counter-clockwise.

Dextroversion is unrestricted on both sides; the rotary nystagmus increases in amplitude but not in rate. On levoversion the right eye lags a little and the rotary nystagmus changes to clock-

wise. The lagging of the right eye is due apparently to weakness of the right internus and accounts for the position of the patient's head in fixation. On looking up and to the right the rotary nystagmus changes to clockwise. Up and to the left the rotary nystagmus changes to clockwise. On looking straight down nystagmus becomes horizontal, as is the nystagmus down and to the left. Nystagmus down and to right is more marked than nystagmus down and to the left. There is less resistance on the left side to passive opening of closed lids.

Left palpebral fissure 8 mm. Distinct weakness of levators on both sides. R=L. Pupils 4.5 mm. Reactions, direct—right prompt, left sluggish. Consensual—right sluggish, left prompt. Right vision 16/50; left vision 16/192. Right with minus 3.5 sph. vision 16/19. O. S. V. not improved by plus or minus spherical or cylinder.

Ophthalmoscope.—The right eye shows a large myopic conus down and out. In the left eye there was a large coloboma of the macular region. The form fields show homonymous sector defects.

Dr. W. W. Graves.—The case just reported by Dr. Green probably has but little bearing upon the case reported by Dr. Williamson; but we have reason to assume, in the latter case, the presence of a lesion in the left occipital region and the incompleteness of the form fields bears this out. Such a thing as a complete homonymous anopsia due to a cortical lesion is practically unknown.

The patient is a young man of 24 years, with a healthy parentage and negative family history. He had one epileptic seizure at 12 years of age followed by a period of seven years freedom from attack. Then following an attack of typhoid fever at 19, he began having fits and has had them more or less frequently ever since. He presents a right-sided hemiplegia with a lessened growth of the forearm and hand and a slightly lessened growth of the right lower extremity. The mother states that as an infant he was apparently normal, but she noticed at birth that the two sides of the face were not exactly the same and when he learned to walk he dragged one extremity. We had here an infantile cerebral palsy. Since there was no evidence of any illness we must assume that it was due to a birth trauma or an antenatal condition. Epilepsy is frequently associated with infantile cerebral palsy, but this child did not develop epilepsy until his twelfth year. When he was about nine years of age, he was

thrown from a bicycle and was unconscious for several hours and complained of pain in the head for considerable time after that. Then it was noticed that there was a dent in the left occipital region that his mother had never noticed before. Whether in this case epilepsy was due to the cerebral palsy or to the injury is a question. It will be remembered that the boy was about nineteen when his epilepsy recurred. Epilepsy in cerebral palsy usually occurs in the early periods of life and there is no reason why it might not develop in this case or even be more apt to do so since he had had the head injury. He has a well-developed skull and is intelligent. In the left occipital region at a point about an inch and a half from the middle line is the centre of a distinct depression in which you might place your finger tips. It is such a depression as you might expect from a blow over that locality.

What is particularly characteristic of hemianopsia of cortical origin is its incompleteness, and we are justified in assuming that the fall did produce this depression in the skull and that his visual cortical centers have in some way been interfered with, hence we get a characteristic defect from a cortical involvement of the visual area. We note a striking contrast between these fields and Dr. Williamson's. A quadrant anopsia ending at the middle line is very rare indeed. Such defects are particularly characteristic of lesions involving the optic tract itself or of lesions involving the external geniculate body. Therefore, from the fields alone we would be more inclined to believe that the lesion, whatever its nature may be, is either in the tract itself or in the external geniculate body. It would be very difficult to conceive how a vascular condition that Dr. Williamson assumes to be the cause of the condition in this patient would confine itself to the calcarine fissure alone. Assuming that it were an embolism, a thrombus or the bursting of a blood-vessel in the calcarine fissure, we would expect to find a defect neither quadrant shaped nor ending abruptly at the middle line. There is no reason why a vascular condition might not just as well occur in the tract itself or in the external geniculate body. Dr. Williamson has noted neither an increase nor a betterment in this condition, therefore the assumption that it is vascular in origin is probably correct. He has failed to get Wernicke's pupillary reaction. If he could get it, it would be practically confirmatory of the view that the lesion is either in the tract or in the external geniculate body. In lesions of the external geniculate body and in lesions of the optic tract, it is common to find optic atrophy, but anything

beyond that does not bring about an optic atrophy. Therefore, I agree with Dr. Williamson that he has reason to assume a vascular lesion but I believe that in all probability it is either in the tract itself or in the external geniculate body.

Dr. Williamson stated that his experience with this defect was limited to this case. In the literature he had noted that symmetrical partial defects had been more frequently ascribed to lesions of the cortical center than to lesions of the tract. If the crossed and uncrossed bundles lies separate, how could one hæmorrhage produce double destruction of the bundle of fibres?

Ossification of the Eyeball (Specimens).—Dr. A. Alt.

Microscopical sections of the eye presented at the previous meeting. This eye is a pathological museum in itself. There is bone formation with marrow, of very large extent, inside the choroid and ciliary body; the lense is carcareous. In the cornea there are deposits of what for want of a better name we call colloid. The anterior chamber forms a cyst lined with endothelium throughout.

DISCUSSION.

Dr. Williamson asked Dr. Alt whether he could determine where the bone was springing from? Was it true, as Knapp believed, that the bone always sprang from choroidal tissue?

Dr. Alt stated that the bone was growing around the blood vessel. There were two ways of bone formation, one where the bony tissue seemed to appear in preformed connective tissue, and the other where the lime lies at first free in the tissue, and gradually ossifies, as exemplified where bone joins cartilage in other parts of the body.

JOHN GREEN, JR.,
Secretary.

Meeting of December 11, 1907.

A Case in which, to Cure a lacrimal Abscess, it Became Necessary to make a False Passage (Patient).—Dr. W. H. Luedde.

Three years ago this man was struck one the nose with a base ball bat. The compound fracture of the bones was dressed by a physician. Five days later the sutures were removed. There has been some discharge of pus ever since. He has received no

treatment during this time. There was a small sinus at the right side of the nose from which pus discharged. Considerable swelling of lower eyelid and cheek at inner end. I passed a No. 4 Bowman probe to the upper end of the lacrimal canal by the upper canaliculus. Pressure on the probe cause a flow of thick pus from the sinus. I injected a 1/5 per cent silver nitrate solution, washing out the abscess cavity freely and continued to wash it every second day. Trial with No. 4 and 6 probes showed no communication between the upper end of the lacrimal canal and the nose. On the 9th day, because the fistulous opening was becoming obstructed, there was a slight extravasation under the skin. Following this extravasation I continued to use only a normal saline solution, simply to know that the abscess cavity was being emptied. The tenderness ceased very qiuckly and the swelling went down so rapidly that it looked as if I had used some special remedial agent. The fistulous opening closed five days later and the discharge became much less. There was no longer a purulent secretion. It consisted of a quantity of glairy mucus. I continued the injections of normal saline solution into the cavity, the return flow being by the lower punctum.

Attempts to pass probes to the nose were unsuccessful. I then sent the patient to Dr. Sluder for a nasal examination, who found a very large, overhanging, hypertrophied turbinate. After he had shrunk the turbinates I attempted again to pass the probes and was at last able to do so by raising the tip slightly and passing it forward. A copious epistaxis showed that it had passed into the nose. This was a No. 1 Bowman probe. I could not pass the No. 2 probe. Two days later the injections employed trickled into the nose so that the patient could taste the solutions. I have continued probing at intervals of a week using the Nos. 4, 5, and 6 Bowman probes and during one interval of two weeks the canal has remained perfectly open, solution injected by upper punctum passing in a stream to nose before probe was passed. I think that in this case there is a false passage which was the only available passage under the circumstances. There was a mechanical obstruction, the result of trauma. Natural relations were disturbed. The treatment was simply mechanical. I do not think much importance attaches to the solutions used. A question that might come up is what to do with this depression at the sinus. After the first week, when there seemed no chance of going through to the nose, I advised him to have the lacrimal gland removed, but he was unwilling and I did not insist.

I shall feel more inclined toward this conservative line of treatment in the future as the result in this case has been so satisfactory.

DISCUSSION.

Dr. J. Ellis Jennings said that the practical question was how long would the passage remain open. He had treated many lacrimal cases and had found that in the presence of a bony stricture it was almost impossible to keep the duct open and treatment was very unsatisfactory. The quickest method would be the removal of the lacrimal sac. Unless probed every few days it would not stay open very long.

Dr. Green stated that possibly the introduction of a gold style might be of assistance in this case. In a case of simple stricture of the duct, he had made a little impression by probes alone, but a permanent opening was effected by the use of a lead and then of a gold style, as suggested by Weeks. One question that this case brought up was in regard to the danger of such a puncture through an infected sac leading to nasal or even orbital infection. Possibly the injection of paraffin might remedy the depression in the cheek.

Dr. Barck did not believe this opening would remain open unless the probing was continued indefinitely. Furthermore, he considered it dangerous to go through the bone so near the ethmoidal cells. The infectious material might be carried into the maxillary sinus. As to the use of the style, they should be put in only far enough to permit touching the upper end. To heal in little canulas of gold was quite the fashion in the 17th century, and the French surgeon, Dupuytren, stated that he had had to remove some half hundred of them, because they made inflammatory symptoms afterwards. While many cases could be cured without the removal of the lacrimal sac, in others it was absolutely impossible to give relief without such a procedure. He could not understand the statement made by Dr. Theobald, of Baltimore, in his text-book, that he found it never necessary to extirpate a lacrimal sac. But to say that extirpation of the lacrimal sac in every case was necessary, was going too far.

Dr. Luedde believed that some of these cases got well and remained well. He felt he would rather take chances on a constriction in a bony canal that remained open two weeks at a time, than he would with obstruction in a canal in soft tissues. This opening being through the wall of the bony canal did not

jeopardize the ultimate successful issue. If this opening into the nose had been above the inferior turbinate there might have been danger of infection of the antrum or accessory sinuses, but the opening was below and not above the inferior turbinate, and there was no reason to anticipate trouble from these sources. The passage was not made until every other attempt to pass the probe had been a failure.

Degeneration of the Choroid (Patient).—Dr. E. H. Higbee, Jr.

This is a case of degeneration of the choroid that is rather remarkable in its extent. There is scarcely any of the choroid that has not been inflamed and become degenerated, yet the choroidal vessels, especially the layer of larger vessels, are very plain and do not seem to have undergone any particular change, ophthalmoscopically. There is secondary atrophy, following a neuritis; this atrophy seems to be stationary now as he has had about the same acuity of vision for the past year. The condition is of syphilitic origin and I show the case because of the amount of destruction of the choroid and the good picture it gives of the choroidal vessels, and the fact that he still has vision of 14/17.

DISCUSSION.

Dr. Post said that the patient was a railroad engineer. He was now 43 year old and had run an engine up to about three years ago, which was the first time he had noticed any trouble with his sight, so the development of the condition must have been gradual. There was a history of specific infection fifteen or sixteen years ago. Whether the patient had been treated for that, the speaker did not know. It appeared to him to be a case of specific infection where the retina was involved, and he believed it had been a syphilitic retinitis at the start and was now a chorioretinitis.

Rupture of the Sclera (Patient).—Dr. C. Barck.

This patient was injured about three weeks ago. There was a rupture of the sclera about 1 mm. wide, encircling the cornea for about 1/3 of its extent with an enormous hæmorrhage into the anterior chamber. A large amount of blood has been resorbed, the iris is retracted backward and the scleral wound is considerably wider now. The question comes up whether the crystalline lens is lying in the scleral wound. He had seen a

similar case where the lens was lying partly in and partly out of the wound. He simply removed the lens and saved a certain amount of sight. The question arises, whether it is advisable in this case to remove the lens.

Localization and Removal of Piece of Copper from the Eye.—Dr. J. Ellis Jennings.

Geo. A., aged 22, consulted me October 12, 1907, and gave the following history: One month ago at St. Joseph, Mo., while watching a companion shoot at a mark with a 22 calibre rifle felt something strike the left eye, presumably a piece of cap from the rifle. In a short time violent inflammatory symptoms set in with severe pain which has persisted up to the present time. Several ophthalmologists were consulted, a skiagraph was made by Dr. Wells, which showed the presence of two foreign bodies. He was strongly urged to have the eyeball enucleated. This he refused to have done. When he consulted me I said that he had had the best advice and that the only thing to do was to have enucleation done at once, that there was no chance of restoring vision in that eye, and the other was in great danger. He would not consent, but stated he wanted me to make an attempt to remove the foreign bodies. He handed me the chart locating the foreign bodies made by Dr. Wells. One foreign body was 1½ mm. in diameter located in the ciliary region on the nasal side, 5 mm. below the horizontal plane. The other not larger than the point of a sharpened led pencil was some distance behind the first. As no harm could result from an attempt at extraction, I made a section down and in 2 mm. behind the limbus at the point indicating the larger foreign body. I removed a small bit of iris and the foreign body came away with it. I failed to find the smaller piece and then bandaged the eye. I still urged enucleation and as the pain continued, he finally consented, and the eyeball was removed October 15th, three days later. A few days ago I told Dr. Wells that by means of his chart I was able to remove a piece of copper from the eye and would report the case to the ophthalmic section. As the patient had carried away the plotted chart, I asked Dr. Wells to send me a duplicate. He made a second chart and in it localized the second foreign body outside of the eyeball between it and the orbital wall. From a rough drawing of the original chart, I made on my history card; I am sure the second foreign body was in the eyeball. So yes-

terday I made an antero-posterior section of the eyeball and after a careful search found it midway in the vitreous embedded in the vitreous. I have not attempted to remove it from its position or to feel of its consistency as I would like the members present to see it in situation.

DISCUSSION.

Dr. H. P. Wells referring to his failure to localize the smaller piece of copper, had consulted his plates again and found that the smaller piece which he had localized in the first chart was not as clear as the larger piece. There were three or four little translucent spots in the immediate locality of the foreign bodies, any one of which might have been taken for the smaller piece. When making the chart that he had sent to Dr. Luedde, he had evidently taken one of these into account and in making the last chart, which was sent to Dr. Jennings, he had taken one of the others into account. The slightest motion of the eye during the exposure would affect the image in the case of so small a particle. But the fact remained that in the second plate there had been nothing that he could clearly identify as being the shadow of the smaller body. As to the indicator wire covering the foreign body, as mentioned by Dr. Jennings, that was not a possible explanation, for even if the piece had lain immediately in that line in the first exposure, the second exposure was made at a different angle, and it was in the second exposure that the clear image could not be found. Furthermore, if he remembered it correctly, the smaller piece did not lie in the median line as did the indicator wire.

Dr. Wells was far less interested in the successful cases than in those showing discrepancies, and he sincerely hoped that the gentlemen would always advise him when any of his charts failed to agree with the surgical findings. If Dr. Wiener were present he feared that the doctor would contribute another piece of evidence against him, for he recalled one case in which he had found a foreign body near the upper posterior wall of the globe, yet in which case the vitreous cleared up entirely and the doctor could see no foreign body with the ophthalmoscope. This case was subjected to a subsequent examination which located the foreign body about 2 mm. farther posteriorly than in the first localization, placing it just outside the eye. The technical difficulties in this work were numerous, as for instance, the patient might move the eye, or might fail to keep his sight centered on the spot and thus lead to an error or blurring of the image.

Or if there was any condition that interferred with co-ordination of vision, that would also have to be taken into account. Yet in upwards of a hundred localizations he had not had a case brought to his attention which pointed seriously to any great danger of error that could not be overcome by a sufficient amount of care in the work.

Dr. Barck asked if the radiograph had been taken after the removal of the first piece of copper, or before.

Dr. Jennings replied that it was done before the removal of the first piece.

Dr. Barck thought the foreign body was probably not now where it was before these manipulations.

Dr. Jennings agreed with Dr. Barck that the foreign body had probably changed its position, but according to the last chart made by Dr. Wells, the second piece was not in the eye at all. Dr. Wells made the first chart about three weeks after the injury. It was easy to understand how there might have been an inflammation and the body as a result pretty well fixed in its position. Then the picture was taken and one piece removed, but a pulling of the tissues forward would not displace the other foreign body backward, so that the position of the copper, if it had been changed by the manipulation, would be forward.

Dr. Wells had no doubt at all that in the first place the smaller body was shown clearly, but he would be utterly unable to locate it accurately unless it showed in both plates.

Tumor of Cheek Adjacent to Lower Lid (Patient).—Dr. H. Muetze.

The patient, a boy 13 years old, was struck on the right side of his nose by a baseball bat in June. Soon after the right eye began to water and a swelling appeared between the inner canthus and the nose. It grew very rapidly and the family physician, who was consulted about two months after the injury, referred the case to me, September 11th. When I saw the patient the tumor was quite large. It extended from the roof of the orbit to the wing of the nose and from the root of the nose it encroached considerably upon the eyeball. It felt soft like putty, was immovable and aspiration proved negative. The patient stated that since the last few weeks the eye had not watered any. Removal of the tumor was proposed under other anesthesia in the latter part of September. I succeeded in dissecting it out

without difficulty, until the superior posterior portion was reached, which seemed to be tightly adherent to the bone. Here the cystic wall of the tumor ruptured and part of it had to be removed by curette. The sac contained no fluid but soft tissue, the consistency and appearance of which reminded one of adenoid vegetations. The anæsthetist unfortunately lost the specimen, which was given to him for examination by the pathologist. The wound healed by first intention and I was beginning to congratulate myself upon the good result, when one day I noticed that the right eye was watering some. I felt for and found what I thought to be the tear-sac with thickened walls resembling a small bean in shape and size. I immediately sounded the canal, which procedure was both difficult and painful and have continued so until recently.

The little tumor, however, continued to grow, until now it has attained the size and shape of a small Brazilian nut. Another soft tumor has formed extending from the inner canthus towards the root of the nose. About the size of a marble, it fluctuates, does not appear to communicate with the larger tumor, and aspiration has proven negative. I do not think that the tear sac was destroyed at the time of the removal of the first tumor, else it would not have been possible to sound the canal afterwards.

Dr. Luedde thought this to be a tumor involving the connective tissue.

Dr. Louis Rassieur thought it very probably a sebaceous affair, or possibly an atheroma. The skin had grown to the bone, as not infrequently happened when one had gone through the periosteum in operations on the bone. He did not know what other condition of a benign nature could arise there. There were no glandular elements there except those of the skin. The tumor itself could be readily raised from the bone. It might be the result of an implantation of the skin thrust into the wound.

Dr. Ernst Saxl said that to him the whole appeared as a growth extending from the frontal sinus. The frontal sinus would under certain conditions secrete a thick, glairy fluid. No aspiration syringe of any size would bring out a secretion of this character. He had seen two or three cases in which, as the result of a frontal involvement, the eye was pushed down and the lid increased to four times its size. By frontal involvement he meant an inflammation of the frontal sinus. When it became infected the frontal sinus secreted a thick, glairy secretion resembling egg albumin. Afterward, when it became softer, it might be seen

coming out through the infundibulum or through a fistula. A fistula like that took eight or ten months to heal. After the cessation of pus formation there would be continued glairy secretion. The fluctuation here was imperfect, which was always the case in such a condition. If one filled a rubber bag tightly with egg albumin, the fluctuation would be less than if water had been used, because motion was not transmitted so quickly by the albumin as by water.

Dr. Muetze, in conclusion, said that the boy had been struck by a baseball on the right side of the nose last June. Soon after the eye began to water and there appeared a swelling. He had dissected out the sac until the posterior portion was reached, where it seemed attached to the bone and there it burst. He did not believe the present tumor communicated with the frontal sinus. The first one certainly did not. He intended removing it very soon and would report the result.

Demonstration of the Stereoscopic Scotoma Charts of Haitz.—Dr. J. W. Charles.

The stereoscope seems to overcome the difficulty we have all experienced in discovering beginning central scotomata. With the aid of the stereoscope it is very easy to determine whether the patient has a scotoma and to map it out. One simply places these charts in the focus of the lenses of the stereoscope and obtains central fixation of the eye to be examined. Even in ordinary cases of heterophoria the eye does not hesitate. It is ordinarily very difficult to obtain the necessary fixation for mapping of small scotomata.

DISCUSSION.

Dr. Luedde stated that this test was so accurate that it had been claimed that it was possible to detect a scotoma for red after the patient had smoked a strong cigar.

JOHN GREEN, JR.,..
Secretary,

ABSTRACTS FROM MEDICAL LITERATURE.

By W. A. Shoemaker, M.D.,

St. Louis, Mo.

SERUMS AND METALLIC FERMENTS IN OCULAR THERAPEUTICS.

A. Darier (*The Ophthalmoscope,* Oct., 1907), having noticed a corneal infiltration, which he judged was diphtheritic, rapidly disappear after the use of antidiphtheritic serum, was led to employ the serum regularly in cases that resembled diphtheritic conjunctivitis, combining with it the usual local treatment. In 1903 he treated a baby with purulent streptococcal infection of both corneæ by giving three injections of the Roux antidiphtheritic serum in the course of three days in addition to the usual local treatment, obtaining an almost perfect result, and since then he has used the serum in the treatment of all cases of ulcer of the cornea even when due to the gonococcus and has always found it of benefit.

Shortly after Römer published the results he obtained from the use of antipneumococcic serum in the treatment of infective ulcerations of the cornea, Darier had three cases of hypopyon-keratitis and being unable to obtain Römer's serum he used the antidiphtheritic serum with very favorable results. Later, having used Römer's serum in other cases he found the action of the two serums—antipneumococcic and antidiphtheritic—practically the same. A confrère was not surprised at this and suggested that he try the antitetanic serum, which he did unwittingly, thinking he was using the antidiphtheritic, and the results were the same as with the other serums used.

He explains the fact of the similar action of all these serums by presuming that when an animal is infected with as active a poison as any of these are that all the tissues of the body are on the defense and produce a large supply of anti-bodies, or antitoxins, which when injected into the body of a patient suffering with any infective disease will assist the organism to overcome that disease. He has used the antidiphtheritic serum in a case of endogenous infection following cataract extraction

and also in a case of irido-choroiditis, following a penetrating wound of the ciliary region, with excellent results, and he recommends its use as a prophylactic, where one fears a post-operative infection. He refers to Boucheron's use of antistreptococcic serum in the treatment of rheumatic iritis. While that did not prove successful Darier thinks it would be interesting to try the use of the polyvalent serums, now available in this disease. He refers to the interesting results that have been obtained by the use of intravenous injections of collargol in the treatment of infective ulcers of the cornea, gonorrhœal iridocyclitis, panophthalmitis and in septic post-operative complications, and thinks it would be wise to begin the treatment of such cases by using the serum and then follow up with the use of collargol injections.

Reference is also made to Deutchmann's results obtained by the use of a serum secured by immunising animals by means of yeast, and also to Robin and Bardent's communications concerning colloidal silver and metallic ferments. Since the value of the serums is due to the oxydases in them which are capable of destroying the toxins, it is likely that oxidation lies at the bottom of the fight made by the organism against infective agents and their toxins.

Darier says: "The conclusion of the whole matter is that simple, non-specific, antitoxic serotherapy should in the future be employed as an important agent in general therapeutics and in the prophylaxis in all infections, general or local, without prejudice to the local treatment."